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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/628,085	07/24/2003	Dennice F. Gayme	H0005645- -1170	3521

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EXAMINER	
MANCHO, RONNIE M	

ART UNIT	PAPER NUMBER
3663	

DATE MAILED: 10/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/628,085	GAYME ET AL.	
	Examiner	Art Unit	
	Ronnie Mancho	3663	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 July 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,5-7,9-12,14-16,18-23,25,26,28-31,33,34 and 36-38* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,5-7,9-12,14-16,18-23,25,26,28-31,33,34,36-38* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Status

1. This is a final from the amendment submitted 7-27-05.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 2, 5-7, 9, 10, 12, 14, 18, 19, 21-23, 28, 29, 31, 36, 37 rejected under 35 U.S.C. 102(b) as being anticipated by Scott (6098011).

Regarding claim 1, Scott (abstract, figs. 1, 2&7) discloses a fault detection system for detecting faults a turbine engine, the fault detection system comprising:

a sensor (A, B) data processor 36, 26, the sensor data processor receiving sensor data from the turbine engine and augmenting the sensor data to provide an augmented data set, wherein the sensor data processor augments the sensor data by generating residuals from the sensor data and determining a rate of change of the residuals; and

a fuzzy logic inference system 40, the fuzzy logic inference system receiving the augmented data set, and wherein the fuzzy logic inference system includes a plurality of membership functions, and wherein each of the plurality of membership functions is associated with at least one data type in the augmented data seta, and wherein the logic system fuzzifies the augmented data set using the plurality of membership functions and analyzes the augmented data

set to determine a likelihood that a fault (i.e. errors 28, 38; col. 3, lines 1-65) has occurred in the turbine engine.

Regarding claim 2, Scott discloses the system of claim 1 wherein the sensor data processor augments the sensor data by determining a rate of change of the sensor data.

Regarding claim 5, Scott discloses the system of claim 1 wherein the sensor data processor augments the sensor data by computing a margin for the sensor data.

Regarding claim 6, Scott discloses the system of claim 1 wherein the aircraft system comprises a turbine engine and wherein the sensor data comprises engine speed data, fuel flow data and exhaust gas temperature data.

Regarding claim 7, Scott discloses the system of claim 1 wherein the aircraft system comprises a turbine engine and wherein the sensor data processor receives exhaust gas temperature data and wherein the sensor data processor augments the exhaust gas temperature data by determining exhaust gas temperature margin data corresponding to a difference between the exhaust gas temperature data and a maximum safe temperature.

Regarding claim 9, Scott discloses the system of claim 1 wherein the fuzzy logic inference system includes a plurality of rules, and wherein the fuzzy logic system evaluates the fuzzified augmented data set according to the plurality of rules.

Regarding claim 10, Scott discloses the system of claim 9 wherein the fuzzy logic inference system further aggregates outputs of the plurality of rules and defuzzifies the aggregated output for input into a diagnostic system.

Regarding claim 12, Scott discloses a method of detecting faults in a turbine engine, the method comprising the steps of:

a) receiving turbine sensor data from the turbine engine;

b) creating an augmented data set from the sensor data by determining residuals of the sensor data and determining the slope of the residuals;

c) fuzzifying the augmented data set by applying membership functions to the augmented data set; and

d) applying a plurality of fuzzy logic rules to the fuzzy augmented data set to determine a likelihood of a fault in the turbine engine.

Regarding claim 14, Scott discloses the method of claim 12 wherein the step of creating an augmented data set further comprises computing a margin for the sensor data.

Regarding claim 18, Scott discloses the method of claim 12 wherein the step of applying the plurality of fuzzy logic rules to determine a likelihood of a fault in the turbine engine further comprises aggregating an output of the plurality of logic rules.

Regarding claim 19, Scott discloses the method of claim 18 wherein the step of applying a plurality of logic rules to determine a likelihood of a fault in the turbine engine further comprises defuzzifying the aggregated output for input into a diagnostic system.

Regarding claim 21, Scott (abstract, columns 2-8; figs. 1-7) discloses the program product comprising:

a) a fault detection program, the fault detection program including:

a sensor (A, B) data processor 36, 26, the sensor data processor receiving sensor data from a turbine engine and augmenting the sensor data to provide an augmented data set, wherein the sensor data processor augments the sensor data by generating residuals from the sensor data and determining a rate of change of the residuals; and

a fuzzy logic inference system 40, the fuzzy logic inference system receiving the augmented data set, and wherein the fuzzy logic inference system includes a plurality of membership functions, and wherein each of the plurality of membership functions is associated with at least one data type in the augmented data seta, and wherein the logic system fuzzifies the augmented data set using the plurality of membership functions and analyzes the augmented data set to determine a likelihood that a fault (i.e. errors 28, 38; col. 3, lines 1-65) has occurred in the turbine engine; and

b) computer-readable signal bearing media bearing said program.

Regarding claim 22, Scott discloses the program product of claim 21 wherein computer-readable signal bearing media comprises recordable media.

Regarding claim 23, Scott discloses the program product of claim 21 wherein the computer-readable signal bearing media comprises transmission media.

Regarding claim 28, Scott discloses the program product of claim 2 wherein the fuzzy logic inference system includes a plurality of rules, and wherein the fuzzy logic system evaluates the fuzzzified augmented data set according to the plurality of rules.

Regarding claim 29, Scott discloses the program product of claim 28 wherein the fuzzy logic inference system further aggregates outputs of the plurality of rules and defuzzifies the aggregated output for input into a diagnostic system.

Regarding claim 31, Scott (figs. 1-7, abstract, columns 2-8) discloses the apparatus comprising:

a) a processor-,

b) a memory coupled to the processor;

c) a fault detection program residing in memory and being executed by the processor, the fault detection program including:

i) a sensor (A, B) data processor 36, 26, the sensor data processor receiving sensor data from the turbine engine and augmenting the sensor data to provide an augmented data set, wherein the sensor data processor augments the sensor data by generating residuals from the sensor data and determining a rate of change of the residuals; and

ii) a fuzzy logic inference system 40, the fuzzy logic inference system receiving the augmented data set, and wherein the fuzzy logic inference system includes a plurality of membership functions, and wherein each of the plurality of membership functions is associated with at least one data type in the augmented data seta, and wherein the logic system fuzzifies the augmented data set using the plurality of membership functions and analyzes the augmented data set to determine a likelihood that a fault (i.e. errors 28, 38; col. 3, lines 1-65) has occurred.

Regarding claim 36, Scott discloses the apparatus of claim 31 wherein the fuzzy logic inference system includes a plurality of rules, and wherein the logic system evaluates the fuzzifed augmented data set according to the plurality of rules.

Regarding claim 37, Scott discloses the apparatus of claim 36 wherein the fuzzy logic inference system further aggregates outputs of the plurality of rules and defuzzises the aggregated output for input into a diagnostic system.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claim 11, 15, 16, 20, 25, 26, 30, 33, 34, 38, are rejected under 35 U.S.C. 103(a) as being unpatentable over Scott in view of Ling et al (5718111).

Regarding claim 11, Scott discloses the system of claim 10 wherein the aircraft system comprises a turbine engine and sensor data. Scott just mentioned a group of sensors generally sensing different parameters. Scott did not particularly mention the particular parameter sensed. However, Ling et al teaches of sensors in an aircraft turbine engine wherein the sensor data comprises exhaust gas temperature data, engine speed data, and fuel flow data, and wherein a sensor data processor augments the sensor data by generating residuals from the exhaust gas temperature data, engine speed data and fuel flow data and wherein the sensor data processor further augments the sensor data by determining a rate of change of the residuals, and wherein the sensor data processor further augments the sensor data by determining a margin for the exhaust temperature data corresponding to a difference between the exhaust gas temperature data and a maximum safe temperature.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Scott device as taught by Ling for the purpose of measuring or sensing particular parameters.

Regarding claims 15, 16, 20, 25, 26, 30, 33, 34, 38, Scott discloses the method of claim 12, but did not mention the particular parameters senses by the sensors. However, Ling et al teaches the following:

In claim 15, sensor data comprising engine speed data fuel flow data and exhaust gas temperature data;

In claim 16, sensor data includes exhaust gas temperature data and wherein the step of augmenting the sensor data comprises determining an exhaust gas temperature (EGT) margin from the exhaust gas temperature, the EGT margin corresponding to a difference between the exhaust gas temperature data and a maximum safe temperature;

In claim 20. sensor data comprises exhaust gas temperature data, engine speed data, and fuel flow data, and wherein the step of creating an augmented data set from the sensor data comprises generating residuals from the exhaust gas temperature data, engine speed data, and fuel flow data, and wherein the step of creating an augmented data set from the sensor data further comprises determining a rate of change of the residuals, and wherein the step of creating an augmented data set from the sensor data further comprises determining a margin for the exhaust gas temperature data corresponding to a difference between the exhaust gas temperature data and a maximum safe temperature;

In claim 25, sensor data comprises engine speed data, fuel flow data and exhaust gas temperature data;

In claim 26, sensor data processor receives exhaust gas temperature data and wherein the sensor data processor augments the exhaust gas temperature data by determining exhaust gas temperature margin data corresponding to a difference between the exhaust gas temperature data and a maximum safe temperature;

In claim 30, sensor data comprising exhaust gas temperature data, engine speed data, and fuel flow data and wherein a sensor data processor augments the sensor data by generating

residuals from the exhaust gas temperature data, engine speed data, and fuel flow data, and wherein the sensor data processor further augments the sensor data by determining a rate of change of the residuals, and wherein the sensor data processor further augments the sensor data by determining a margin for the exhaust gas temperature data corresponding to a difference between the exhaust gas temperature data and a maximum safe temperature;

In claim 33, sensor data comprises engine speed data, fuel flow data and exhaust gas temperature data;

In claim 34, sensor data processor receives exhaust gas temperature data and wherein the sensor data processor augments the exhaust gas temperature data by determining exhaust gas temperature margin data corresponding to a difference between the exhaust gas temperature data and a maximum safe temperature;

In claim 38. sensor data comprising exhaust gas temperature data, engine speed data, and fuel flow data, and wherein the sensor data processor augments the sensor data by generating residuals from the exhaust gas temperature data,

engine speed data, and fuel flow data and wherein the sensor data processor further augments the sensor data by determining a rate of change of the residuals, and wherein the sensor data processor further augments the sensor data by determining a margin for the exhaust gas temperature data corresponding to a difference between the exhaust gas temperature data and a maximum safe temperature.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Scott device (claims 15, 16, 20, 25, 26, 30, 33, 34, 38) as taught by Ling for the purpose of measuring or sensing particular parameters.

Response to Arguments

6. Applicant's arguments filed 7-27-05 have been fully considered but they are not persuasive.

The applicant is arguing that the prior art Scott "does not disclose a fault detection system as claimed". The examiner disagrees. Even though Scott's title cites a --fault accommodation algorithm-- and the drawing expressly indicating a sensor system of a turbine engine, the applicant insists that Scott does not disclose a fault detection system as claimed. And more to that the applicant urges that in Scott, errors 28 and 38 refer to differences between sensor values and that the sensors are not outputs used to indicate a likelihood of a fault in a turbine engine. In response, the examiner believes that the applicant's arguments are way off the tangent. They have no basis since Scott in columns 2&3 disclose sensing many parameters in a turbine engine, wherein each parameter of the many parameters is sensed by two sensors. When there is a difference in the sensed parameter between the two sensors, then a likelihood of a fault in the turbine engine is known to occur. The magnitude of the error is determined by making reference to a table of stored data, afterward a decision is made based on the magnitude of the error sensed.

The applicant's arguments cannot stand in view of Scott. It is believed that the rejections are proper and thus stand.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Communication

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ronnie Mancho whose telephone number is 571-272-6984. The examiner can normally be reached on Mon-Thurs: 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Keith can be reached on 571-272-6878. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Ronnie Mancho
Examiner
Art Unit 3663

10/17/05

JACK KEITH
SUPERVISORY PATENT EXAMINER